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ABSTRACT

Based on the idea that even the most barren-looking black-topped schoolyard can be used for regular, brief field trips, this curriculum package of springtime science experiences provides guidelines for conducting kindergarten learning activities outside the classroom. Goals of the field trips are to teach some pre-reading concepts, to begin the development of deep cognitive thinking, and to look for opportunities for affective teaching. Learning activities focusing on weather, plants, and small animals are provided in a format that includes (1) a statement of purpose or plan, (2) suggested questions and/or statements the teacher may use to direct the children's attention, and (3) possible followup activities such as poems that are thematically related to the lessons. (Author/RH)

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California State College

San Bernardino

ONCE UPON A SPRINGTIME:
KINDERGARTEN SCIENCE EXPERIENCES
TO ENHANCE READING READINESS

A Curriculum Development Proposal Submitted to
The Faculty of the School of Education
In Partial Fulfillment of the Requirements of the Degree of
Master of Arts
in Education: Reading Option

by

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1978

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Chapter 1

GENERAL INTRODUCTION

As children pour out of the bus or come from the neighborhood on the first day of Kindergarten, they may come with little or no readiness for school life. It is a certainty that they come with differing abilities to use their five senses and the developing parts of their minds and thinking.

To prepare these children for reading plus the multitude of other tasks required of them as they grow older, there should be purposeful teaching in Kindergarten that will lessen the difficulties encountered later on.

However, Kindergarten teaching is becoming increasingly academic, and there is little time for a full-scale program to develop curiosity or a number of other skills needed by a mind as it matures for true learning to take place.

It is true that curriculum guides and continuums usually include science as a way of developing many of the above skills. In the last decade, there has been a definite call for educators to include science in the lowest grade level program. Two examples of these are: SAPA (Science--a Process Approach), produced by the American Association for the Advancement of Science, and SCIS

(Science Curriculum Improvement Study), the latter, for example, having a Kindergarten component, "Beginnings," released in 1974 as the final portion of a ten-year development of science programs, under the direction of Dr. Robert Karplus at the University of California at Berkeley, with National Science Foundation funding.

However, under the pressure of teaching the basic academic skills of knowing names and sounds of the alphabet, and how to form them, plus a great many basic concepts, there is little time for a formal, highly-structured science program. This is true even if the teacher feels that it would be efficacious as a means of better preparation for learning to read.

Moreover, it is highly probable that the child still does not observe much beyond himself/herself. His/her senses may not as yet be fully awakened to the surroundings. Before the eyes are focused on books and ears attuned to words and phrases, there should be an effort to develop the senses for finer discriminations than are usually found in the child's senses when entering school. Success in reading may depend on this.

For the fullest appreciation of reading, for meaning beyond the form of words on the page, there should be affective learning. How can an appreciation of beauty or other appropriate emotions be felt when reading if the child has never had experiences that teach in the affective domain?

The current vital necessity of interest in ecology in today's world should require the Kindergarten teacher to do something in the crowded hours to ensure right attitudes and thinking about the precarious balance of nature around us, while at the same time helping children to develop those mental and physical skills needed for reading readiness.

The reconciliation of these factors, with a lightening of the teacher's burden, is the purpose of this paper.

Chapter 2

REVIEW OF THE LITERATURE

In any discussion of learning, it is necessary and important to know how one learns. There are many schools of thought on this subject. More than one fits the basic premise given in this paper by the author.

LEARNING THEORIES

One is the Differentiation Theory in which the organism (child) is stimulus-oriented, this gradually leading to a change in the ability to discriminate. In the development of perception, the process by which one gets information from the environment around it becomes adaptive and regulatory, rejecting unwanted stimulation. From discrimination between gross objects, the child progresses to finer discrimination as he/she learns to selectively pay attention in his/her observation of the environment. This growing perceptual learning is not a passive process, but is active--exploring and searching. As the child learns to perceive order in environmental structures, he/she becomes better able to later become a facile reader, easily able to make the fine mental distinctions between letters, words, and phrases (Gibson in Rydell 1971; Gibson 1969).

Another viewpoint that is also compatible with the paper's premise is that of thinking of learning as percepts that develop from impressions of sensations caused by an environmental stimulus which does not require much interpretation. Percepts often initiate trains of thought, and are the basis for concepts which lead to generalizations. What the senses take in shapes and influences perceptions (Russell 1956). Perception is a process by which much of the raw materials of thinking become usable. They are among a child's earliest learnings (Russell 1960).

Both Gibson and Russell have the same basic thought--the child learns and develops mentally in reaction to environmental stimuli.

By the time a child reaches school age, a teacher feels able to help the child expand the ideas he/she has of the environment, from which stimuli and percepts are derived, to include the schoolroom, the schoolyard, and eventually the entire school.

READING READINESS

In thinking further about preparation of the child to learn to read, one must know the needed concepts and processes necessary for reading readiness. Table 1 and Table 2 give those factors deemed by educators as the most worthwhile as a basic foundation (Barufaldi 1977).

Table 1

Reading Readiness
Factors in Understanding: Concepts

Space relationships	Time relationships	Number relationships	Colors	Conditions
around	before/after	none/all	black	hot/cold
away	never/always	few/many	white	wet/dry
by	once/always	either/both	blue	soft/hard
far/near	now/then	little/much	brown	awake/asleep
in/out	yesterday/today	one/six/nine	green	warm/cool
open/close	today/tomorrow	short/tall	red	old/new
to/from	never/soon	short/long	yellow	alike/different
front/back/middle	morning/night	big/little	orange	fast/slow
top/bottom	if/then	small/large	purple	empty/full
first/last	why	narrow/wide		
high/low	how	thin/fat		
	because			

Table 2

Reading Readiness
Factors in Understanding: Process Skills (Listening/Thinking Skills)

Skill	Activities
Predicting/extending	Predicting convergent outcomes from pictures, titles, oral descriptions. Predicting divergent outcomes. Explaining story character action. Explaining gadget operations. Restoring omitted words.
Locating information	Locating objects. Locating pictorial elements.
Remembering	Remembering simple sentence content, paragraph content, story content.
Organizing	Retelling sentence, sentence set, paragraph story. Outlining sequence orally. Reorganizing communication into a logical sequence, cartoon, picture.
Evaluating	Making judgments about the desirability of a character, situation. Making judgments about the validity of a story description, argument, by making comparisons with other sources of information (external).

From another viewpoint, the most important factors given as important for preparing for reading are the following: language experience, language development, development of visual and auditory discrimination, and development of listening skills (Heilman 1967).

That these skills can be developed and expedited by Kindergarten science is the viewpoint of many (Barufaldi 1977).

SCIENCE

In science, children can handle and study concrete objects to which symbols (words) can be related. Reading itself is the recognition of relationships between symbols and objects. Words take on more meaning when the child has handled objects and taken part in experiences that now have meaning in words (Baker 1974).

If a teacher feels compelled to use a structured science program, there will be some good results, depending on the teacher and the post-testing. SAPA (Science--a Process Approach) is one of the more structured approaches. Table 3 gives the skills to be learned during Kindergarten (Barufaldi 1977).

Two differing results were obtained from the use of SAPA in two studies. Listening skills were enhanced in one study, while oral output and expressiveness, vocabulary, general meaning and ideas, sentence structure, defining words, and listening behavior had higher scores in the

other. The first was post-tested with the Metropolitan Reading Test, and the second with an investigator-made test, the Test of Oral Communication Skills (Ayers 1969; Huff 1973).

Table 3

Science--A Process Approach

Skills	Level A topics
1. Observing	Observing: perception of color.
2. Classifying	Space/time: recognizing and using shapes.
3. Measuring	Observing: observing color, shape, texture, and size.
4. Communicating	Classifying: classifying leaves, nuts, or shells.
5. Inferring	Using numbers: sets and their members.
6. Recognizing number relations	Space/time: recognizing direction.
7. Predicting	Space/time: observing movement.
	Observing: observing color change.
	Measuring: beginning measurement--comparing lengths.

Table 4 shows the results of structured and unstructured science programs with the results, using different evaluation instruments, and showing implications about reading readiness (Barufaldi 1977).

When a child has the opportunity to respond verbally to environmental stimuli, he/she cannot help gaining more verbal ability. It is felt that vocabulary has a high correlation with mental ability (Thompson 1974).

Table 4

Science Education Research Studies: Reading Readiness and Oral Language

Author/Date	Variables investigated	Program used, sample used	Evaluation instrument	Conclusions
Ayers, J. B. Mason, G. E. 1966	The effect of SAPA science experiences on changes in reading readiness.	SAPA--Level A. Kindergarten in Atlanta, Georgia	Metropolitan Readiness Test	Total reading readiness scores significantly higher in science groups. Listening, Numbers, and Copying scores higher in science group. Control group better on Word Meaning.
Rowe, M. B. 1968	The effect of SCIS on the verbalizing of innercity children.	SCIS--Material Objects. First graders in New York City.	Evaluation by trained observers.	Observers not able to identify low verbal children in SCIS activities. The most spontaneous language (complete sentences) occurred during the SCIS activities. 200 percent more than language arts.
Ritz, W. C. 1969	The effect of SAPA and/or the Frostig Program of Visual Perception programs on reading readiness perceptual skills, and science process skills.	SAPA--Level A. Frostig Program of Visual Perception. Kindergarten in New York and Pennsylvania.	Metropolitan Readiness Test; Frostig Developmental Test of Visual Perception; Science Competency.	No significant differences between groups on reading readiness. Effects from the Frostig program, only short-term science competency changes.
Neuman, D. B. 1970	The effect of science experiences, written by the author, on reading readiness.	The author's activities were based on SCIS and SAPA.	Metropolitan Reading Readiness Test.	Children having science activities scored significantly better on reading readiness. They did better on Listening, Numbers, Vocabulary, and Alphabet; control group did better on Matching.
Kellogg, D. H. 1971	The effects of SCIS--Material Objects unit on reading readiness was compared with Harper & Row Reading Readiness Program.	SCIS--Material Objects. First graders in Ada, Oklahoma.	Metropolitan Reading Readiness Test.	SCIS group outscored control group on total reading readiness score; particularly better on Word Meaning, Listening, Matching, Alphabet, and Numbers. Control did better on Copying.
Huff, P. Languis, M. 1973	The effect of SAPA on oral communication skills of disadvantaged children, including speaking and listening.	SAPA--Level A. Kindergarten in Columbus, Ohio.	Test of Oral Communication Skills (TOCS).	Experimental group significantly better on oral transmission skills, but not listening comprehension receiving subskill.
Bethel, L. J. 1973	The effect of science experiences, written by the author, on oral communication and classification skills.	Author produced. Third graders in Philadelphia innercity.	Test of Oral Communication Skills; Goldstein-Scheerer Object Sorting Test.	Experimental science group showed significantly improved classification and transmitting and receiving oral communication skills.

Actual experiences seem to facilitate the acquisition of vocabulary. While this is only one area of reading achievement, first-hand experience with external stimuli can help the child to internalize verbal responses, improving vocabulary, which improves reading achievement and concept development (Lieberman 1966).

Science experiences have been found to be helpful, also, in improving visual discrimination, a skill directly related to reading. In reading, the child must eventually be able to discriminate between alike and different words and letters, see the sequence of letters in a word, understand the position in space concept, have a left-right concept as well as a directionality concept, and have a good visual memory. These can be taught by the use of science, inside and outside the classroom, without resorting solely to pencil and paper (Their 1976).

If a child is to be an intelligent reader, reading with comprehension and understanding, then higher cognitive skill development should be part of a well-rounded program in Kindergarten.

As children interact with their environments, seeking to understand themselves and the world around them, they are involved in science experiences. These can contribute to intellectual development. Many of the processes of science are the same processes that lead to growth of the mind (Holt 1977; Roche 1977). Some of the processes are: investigating, discovering, experimenting, observing,

defining, comparing, relating, inferring, classifying, communicating, explaining, creating, hypothesizing, analyzing, and predicting.

Holt (1977) gives an idea of what happens when a teacher says, "Look at it." (See Figure 1.)

Probably the single most important learning objective for reading and all other subjects is to be able to reason clearly and efficiently. That the logical reasoning facility is important is implicit in all sub-domains of reading comprehension. While the knowledge of causal relationships has been found lacking in many high school students, it is also true that very young children can handle simplified propositional logic if content and language are within their experience level (Klein 1977). Since Piaget's theory of learning has the reasoning stage of logical abilities coming after ages seven and eight (1954), it is necessary to consciously teach for logical thought as a pre-reading activity (Nevius 1976).

Cognitive development appears to advance on a broad horizontal front, the child being able to transfer skills from one learning experience to another of a similar nature. Problem-solving is one such transferrable skill (Wohwill 1969). The classification skill can be improved by practice with grouping objects, etc. (Siegel 1972).

Hypothesis formation is another important skill to learn, by making statements and drawing conclusions after investigation of many similar materials and forms.

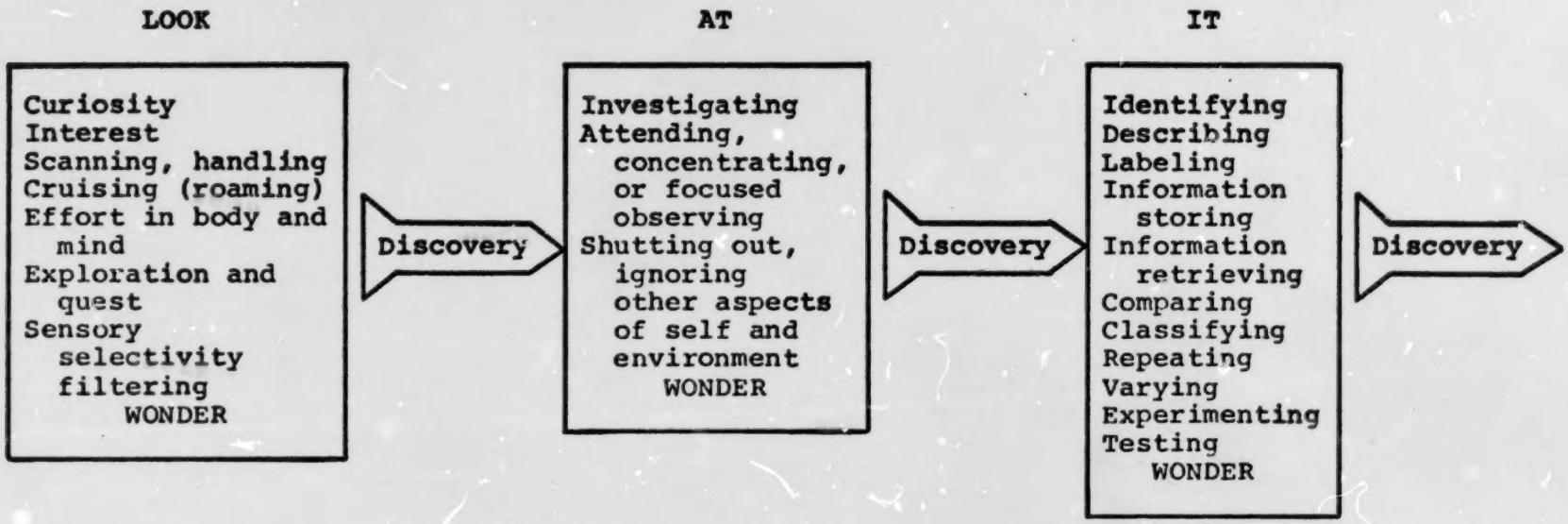
LOOK
Curiosity
Interest
Scanning, handling
Cruising (roaming)
Effort in body and mind
Exploration and quest
Sensory selectivity filtering
WONDER
Discovery
AT
Investigating
Attending, concentrating, or focused observing
Shutting out, ignoring other aspects of self and environment
WONDER
Discovery
IT
Identifying
Describing
Labeling
Information storing
Information retrieving
Comparing
Classifying
Repeating
Varying
Experimenting
Testing
WONDER
Discovery

Figure 1

Activities that can lead to this learning are: patterning, comparing, classifying, and predicting, activities that also provide opportunities for transfer of learning. In learning to observe the environment, patterning and comparison have been found to be particularly helpful in developing this skill in the young child (Goodman in Nevius 1976).

Another desirable concept to be stimulated is that of curiosity. One author included the following poem by Harry Behm about the kind of curiosity meant in this paper (Roche 1977).

Curiosity

Tell me, tell me everything!
What makes it Winter
And then Spring?
Which are the children
Butterflies?
Why do people keep
Winking their eyes?
Where do birds sleep?
Do bees like to sting?
Tell me, tell me please, everything.

Tell me, tell me, I want to know!
What makes leaves grow
In the shapes they grow?
Why do goldfish
Keep chewing? and rabbits
Warble their nose?
Just from habits?
Where does the wind
When it goes away go?
Tell me, or don't even grown-ups know?
(From Windy Morning)

Curiosity, leading to exploratory behavior, mentally and physically, leads to reading readiness, as well as a general competence for other tasks later on (La Crosse 1971).

Discovery is the next step. This is not restricted to unknown material but is also in the rearranging and transforming of material so that one can go beyond evidence to new insights. Using the discovery method is one way of preventing information drift in a child's thinking, and will also serve as an intrinsic reward when the child achieves gratification from coping with problems. It exercises problem-solving, which can transfer to other tasks, as well as leading to conservation of memory, when material is organized in the child's mind according to his/her own interests and cognitive structure (Bruner 1961).

The teacher needs to give children experience from which to learn, rather than just giving them information, since the child needs, as noted above, to feel curiosity, to discover, to test, to ask about, and evaluate as much as is possible by himself/herself--not just accepting blindly what they are told. These become what the child really knows [sic] (Wensberg 1966).

Kindergarten children are able to acquire above-level vocabulary and synthesize facts into a main idea, as well as form concepts concerning issues and citizenship responsibility (Bryant 1977). This shows that Kindergarten children can, when involved in a very interesting, motivating study, go above their own usual grade-level capabilities. The vocabulary acquisition at such a time is never wasted material.

Development of the senses is also an important task of the teacher. In a trial of the Kindergarten component of SCIS (Science Curriculum Improvement Study), one person commented that the structured program developed the senses more than really exploring nature (Spooner 1975). However, a structured program is not the only method that can be used for this. One should remember that the child's world is far more full of excitement and wonder than that of the adult, and the senses can be developed and impressed by walks in the outdoors as well as indoor activities, by the teacher calling attention to this or that. The child needs to become aware, and use eyes, ears, nostrils, and fingertips in exploring nature. The teacher can help by becoming a participant in the learning experience (Carson 1965).

Affective teaching is necessary for a child to become a good reader in later grades. This type of teaching can readily be done with the young child.

The aesthetic aspects of nature can bring joy to the child (Holt 1977). When emotions have been aroused--a sense of beauty, an excitement about the unknown or new, feeling sympathy, love, pity or admiration--then the child wants to know about the object of the emotional response (Carson 1965). With the wanting to know comes the opportunity the good teacher is waiting for.

In assessing science learning, no reading is necessary (Greening 1976) so that Kindergarten is not cut off from science because of lack of reading skills.

The question may arise as to the optimum teaching style a Kindergarten teacher should use for the most part, in teaching science as a discovery activity. The consensus of opinion seems to be that "why," "how," and "if" questions should be asked the children (Lundsteen 1974). The teacher should not answer the questions after asking them, but should ask questions from the answers given to the one before. Kindergarten children should not be required to verbalize concepts. If they can respond to the discussion, and in so doing, sense the concepts, this is enough (Wensberg 1966).

Perhaps the thing that would influence many Kindergarten teachers to use some form of science as a teaching tool is that probably the most powerful form of motivation in childhood is the exploratory drive (Yardley 1973).

Thus far, many of the science experiences and studies have been quite structured in format. There are other valid choices for science learning. In one, suggested guidelines are given for an experience of awareness in a park. The suggestions begin with the formation of questions to ask the children, to be drawn from the district's philosophy of education, and continues with the selection of activities and identifying methods of evaluation to assess the achieving of objectives (Roche 1977). Another source gives little about in-depth pre-planning, the teacher choosing what type of science experience would be appropriate for the occasion, including technology

walks, crawls indoors and out, and exploration of underneaths. These science experiences were to be followed by a discussion (Holt 1977).

The element of time is not mentioned in many of the studies, research papers, or books, but is a definite feature of one presentation. Ten minutes (varying slightly at times) is the time mentioned for environmental schoolyard field trips (Russell 1973).

Almost any kind of science--plants, animals, the interdependence of living things, physical science, earth science, and ecology--can be dealt with by examination, questioning, measuring, observing, being thought about, and being discussed.

At times the trip is an outgrowth of the study of a topic. At other times a definite goal is in mind when the trip begins--perhaps developing buds to be examined or incinerator ash to be collected for analysis.

Using the natural curiosity of children, the teacher is told of the value of saying, "I don't know." With older children, this is a reason for research, and younger ones may see the example of the teacher looking up information in a book. Teacher and pupils may learn together.

These field trips are to be taken on even the most barren-looking blacktopped schoolyard. Somewhere there is some living thing--an ant or a few blades of grass, or there are observations to be made about shadows, heat, or light.

Every school environment has possibilities.

Teacher preparation includes knowing the location of objects in the schoolyard, and perhaps some of the names of things to be found there, as well as being aware of seasonal changes, etc. However, as stated before, teacher and pupils can learn names of weeds, etc., together.

This type of schoolyard field trip lends itself to post activities, such as experience stories in Kindergarten, or setting up a project such as an earthworm home; while in higher grades, ongoing science projects, research, and further study, as well as art projects, can stem from a short happy experience in the outdoors.

The type of schoolyard field trip discussed above includes much that would or could be studied in a more formal setting. The questions to be asked stimulate the kinds of thinking discussed earlier in this chapter. Children's senses are awakened as they use the outdoors for part of their studies.

The desirable factors in science teaching in Kindergarten appear to be as valid in this type of approach as in the use of other science programs, even while requiring little time, and as little equipment as is warranted by what is being studied.

Holt (1977, P. 18) included a thought well worth remembering which is applicable to the type of science teaching just discussed:

It may be the teacher's job to keep the rest of the world at bay for a few moments and let observation happen. The teacher protects the learning moment.

Chapter 3

STATEMENT OF OBJECTIVES

The design of the curriculum package is to take daily or regular ten-minute science walks outdoors in the schoolyard with the Kindergarten class.

The goals of such walks are the following: to teach some pre-reading concepts, begin development of deep cognitive thinking, promote more use of the children's five senses, and look for opportunities for affective teaching. All of these have been shown to have a valid role in a child's becoming a good reader.

Methods include the following: going as a class to a predetermined (by the teacher) part of the schoolyard, and there observing, commenting, comparing, classifying, etc., with the children answering the teacher's "why," "how," or "if," and also asking questions of the teacher, who may give an answer or who may say, "I don't know, but I'll find out." Supplementary information may also be given the children without their asking. While walking in class lines to a definite destination, the teacher may ask questions to call attention to what should be observed and thought about on the way. The teacher can also respond to observations made by class members in a similar situation. While walking with the class, the teacher may seize upon

any unexpected incident as a science learning situation.

In a nutshell, the method is to go outdoors, and with the teacher keeping his/her eyes and ears open, have the class observe, hear, comment upon, etc., what is brought to their attention with a teacher-question or statement, or the statement or question of one of the children.

This may be planned ahead of time as a one-time lesson, be part of a small series, or be the seizing of an unexpected opportunity.

The pleasant thing about this method of learning is that it is in the outdoors, a different locale from the usual, and is an interesting and often stimulating change-of-pace in the teaching session. There are additional benefits personally for the teacher, in a fuller awareness of the surrounding environment and added knowledge about it.

Chapter 4

A CURRICULUM PACKAGE OF SPRINGTIME SCIENCE EXPERIENCES

INTRODUCTION

The following experiences cover some of the areas of science that can be used during the springtime. The format used is as follows: Plan--meaning the activity; Questions and/or Statements--the words that may be used, with children's answers, questions, or statements between the wording given, although no pause is indicated; and Possible Follow-up--optional activities to further the enjoyment and/or learning of the outdoor experience.

Weather/Elements

Rain

1. Sound of the rain

   Plan: Go to a variety of places to hear how rain sounds falling onto grass, dirt, cement or blacktop, on roofs, from roofs, on thickly-leaved trees.

   Questions: Does rain have a sound? Why does it sound different in different places? Does it make a sound going through the air?

Possible Follow-up:

(1) Read poems: "Spring Rain" by Harry Behn; "The Rain" by William Henry Davies; "City Rain" by Rachel Field.

(2) Sing rain songs from Kindergarten music books available. They usually have "pitter-patter" or "drip-drop" in them. Ask if that is really the sound of rain.

2. Beauty of raindrops

Plan: Walk to a place where bare limbs can be seen during the rain.

Questions and Statements: Look at the beauty of the raindrops on the tree limbs. What do they make you think of? What do they look like to you?

Possible Follow-up:

(1) Read the poem "The Rains of Spring" by Lady Ise. Learn the poem "Rain" by Robert Louis Stevenson.

(2) Art--On a large teacher-cut form of a brown-limbed tree, have children glue wadded-up pieces of Saran Wrap, or similar material, along the limbs as they have observed the raindrops outdoors.

3. Weight of water

Plan: Go to a position where you can see rain water on the ground flowing in a definite

direction, or filling a low spot.

Questions and Statements: Why is the water flowing in that direction? Why is the rain filling this piece of ground? Water is heavy, and always flows to the lowest spot.

Possible Follow-up:

(1) Play first part or all of "The Moldau" by Smetana (a classical music rendition of gathering water running into a river, then into the sea).

(2) Have discussion about little raindrops having weight when put together. Make a class experience story about it.

4. The results of rain

Plan: Go to a dry dirt area before and some time after the rain to compare the before and after due to rainfall.

Questions and Statements: (Before) Does it look like anything grows here? Why isn't anything growing here? (After) Were there plants here before? Why are they growing here now? (May be necessary.) The seeds were in the ground, waiting for rain to help them sprout and grow.

Possible Follow-up:

(1) Read poem "In Time of Silver Rain" by Langston Hughes.

(2) Plant radish seeds in milk cartons. Water some, but not others, to emphasize the learning.

Wind

1. The sound of the wind

   Plan: Go to area with trees, by buildings, and to open field space.

   Questions and Statements: Does the wind have a sound? (In the open space) Turn your head so that your ear points toward the wind. Then point your nose toward the wind. When does the wind have a sound? What makes it have a sound in trees and by buildings?

   Possible Follow-up:

   (1) Read poem "Who has seen the wind?" by Christina Rossetti.

   (2) Have imitations made vocally by class members of the different sounds made by the wind as it passes by different objects.

2. The strength of the wind (dependent on speed of wind in area)

   Plan: Go to a large clear space. Let the children spread out coats or sweaters like sails, and be pushed by the wind.

   Questions: What is pushing you? Are you pushed faster or slower when your coat or

sweater is held out? Do you know of anything that depends on the wind to make it work? (Some child may know about wind-driven windmills.)

Possible Follow-up:

(1) Read poem "The Wind" by Robert Louis Stevenson.

(2) Dance: act out being blown by varying gusts of wind to appropriate music.

3. Damage to vegetation as result of wind's blowing

Plan: Look around trees and bushes for blown-off limbs, blossoms, etc.

Questions: Can you see any changes the wind has made? What can we do about it?

Possible Follow-up:

(1) Citizenship: report badly-damaged trees and bushes, etc., in class-dictated note to principal.

(2) Collect dead branches and limbs, and take to trash bin.

4. Environmental disorder as result of wind's blowing

Plan: See if trash has been blown onto school fence on downwind side of schoolyard.

Questions: What has the wind done with papers dropped in the schoolyard? What can we do

about it?

Possible Follow-up:

(1) Art--have each pupil trace own hand, paste scrap paper by it above a pupil-drawn wastebasket.

(2) Citizenship: collect trash along fence.

Plants

Trees

1. Function of roots

Plan: Point out exposed roots of a tree; pull up a small clump of grass.

Questions and Statements: These are roots of this tree. Why does a tree have roots? There are as many roots underneath the ground as there are branches above the ground. They are very busy--growing very tiny root hairs to suck up water. The roots of trees suck up water like you do milk through a straw. See all the roots this bit of grass has. (If a child answers the initial question by saying that it holds the tree in the ground, questions and statements would go on in that direction, per teacher giving the giant redwood as an example. It does not have deep roots, but wide ones, to keep the huge bulk above balanced and anchored.)

Possible Follow-up:

(1) Observe a dead tree on playground, and determine, if possible, the cause of death. If the reason for death is that bark has been pulled off, water from the roots could not reach the branches and leaves. Food made by the leaves could not go to the roots to keep them strong so that they could work. The tiny tubes that carried food and water had been protected by the bark. Plan a ceremony of saying "Good-bye!" to the dead tree, and the planting of a new one.

(2) Take note of any standing water near trees, and see how fast it disappears.

(3) Remind class of tree roots when they are drinking milk through a straw.

(4) Put a piece of celery in blue-tinted water, and have class see how color, representing water, rises in the plant.

2. Further study of roots

Plan: Pull up a sturdy dandelion plant, and break a root and a leaf.

Questions and Statements: What do you see that is alike? (Root and leaf will have milky liquid in them.) If asked, "Did the roots suck up that white stuff?"--No, the plant roots did

not suck up that white liquid. The plant changed the water into that liquid and helped feed the roots to keep them strong.

Possible Follow-up:

(1) Pull up other weeds and see if there are different-colored liquids in those plants. Also note how big the roots are. Are they many and tiny, or just one large one with root hairs from it?

(2) Bring some root vegetables to school to emphasize that we eat some roots. Serve cut-up pieces to the class.

3. Developing leaves

Plan: Lead class to see the leaves when first growing, when they are about the size of raindrops seen earlier on the same limbs.

Statements: (Comment on the beauty of the new leaves. If necessary, remind them of the earlier raindrops. Have a quiet, gazing, remembering time.)

Possible Follow-up:

(1) Art--have class draw tree limbs or cut out a dittoed copy of a tree trunk and limbs; paste on tiny light green pieces of tissue paper.

(2) Visit same trees when leaves are larger, and compare the sizes.

4. Leaves

Plan: Carefully pick several different kinds of leaves. Have class observe and discuss them.

Questions and Statements: How are these leaves different? What does a leaf do for the tree? (Since they probably have little idea, this may have to be a little lecture.) A leaf is a busy factory. Do they look like they are working busily when they are on the tree? They are taking in CO_2 (the air we breathe out) and sunshine and water from the roots, and busily make sap, plant food for the rest of the tree. If there's a hole in the bark of the tree, sap, not water, comes out. In each leaf, so small that you can't see them, little bits of green chlorophyll are going around and around the edges of each little leaf cell, busy making plant food. A lot of the water taken in by the roots goes out of the leaves into the air. (Gear what and how much you say to the knowledge and thinking of the children in the class.) What would happen to a tree if some kind of insect ate all the leaves, or naughty children pulled off the leaves?

Possible Follow-up:

(1) Art--leaf prints, using different kinds of

leaves and tempera paint.

(2) Read the poem "Trees" by Harry Behn.

(3) Leaves are a clue to the identity of the tree. Teacher can look up information about the ones found in the schoolyard; have class learn the names. If they are far enough along in learning letter sounds, a vocabulary chart of names may be made, if tree names begin with different initial consonants.

5. Tree flowers, blossoms

Plan: See which trees have flowers, and compare them. Check limbs of trees to see if any are not producing blossoms or leaves.

Questions and Statements: Look at these beautiful blossoms! How are these flowers on this tree different from the others on that tree? Why isn't this twig (limb, etc.) growing any blossoms?

Possible Follow-up:

(1) Art--Have class members paint tempera paintings of some particularly beautiful tree.

(2) Read poems: "The Fall of the Plum Blossoms" by Ranko; and "Oh, fair to see" by Christina Rossetti. (The latter poem may lead into a discussion about what a blossom turns into--

sometimes a fruit, while other kinds may turn into a seedpod.)

(3) If the above discussion occurs, bring some fruit and nuts, emphasizing that they were once blossoms.

Dandelion

Identification and classification as a weed

Plan: Have class collect all the dandelions they can see on one occasion, yellow and seeded white parts.

Questions: What is pretty about a dandelion? What isn't good about dandelions growing in someone's lawn? What does the yellow blossom turn into? How are the seeds made so that they can travel a long way? (Have them blow the seeded ones and see how far the seeds go.)

Possible Follow-up:

(1) Read poems: "Dandelion" by Hilda Conkling; and "Dandelions" by Frances M. Frost.

(2) In kindergarten yard, have class pick all dandelion blossoms and seeded heads, carefully putting the latter in a paper sack, emphasizing that they are not a good plant in a lawn. The class may want to use the blossoms for a bouquet.

Birds

1. Identification of local birds

   Plan: On walks consciously look for different kinds of birds and point them out to the class. Use the names of birds known to you.

   Questions: What kind of bird is that? Which kind of bird do we see most often? Which bird is largest, smallest, etc.?

   Possible Follow-up:

   (1) Often call attention to birds while on other walks.

   (2) May use poem by the author of this paper (class use only).

The Sparrow

Of all the living birds around,
The sparrow seems most numerous.
In city or in countryside,
He's quick and often humorous.
Winging over fields of hay
Or dodging tires to seize a crumb,
A cheerful beggar on the wing,
His chirping makes the daylight hum.

   (3) Reinforce learning names by collecting pictures of common local birds, and displaying them in class, with discussion.

   (4) Art--make a little fat bird with two strips of construction paper: one made into a larger circle with one end left sticking out to be cut into forked tail; the other

into a smaller circle for the head, glued to the body, with a folded small paper diamond glued on for a beak. Circle eyes may also be used.

2. Bird songs

Plan: Listen to songs of local birds; may refer to the calls as bird talk, having the class listen to see if the bird they see will say anything.

Questions and Statements: Do all birds sing the same kind of song? Do all birds of the same kind sing the same song? (They must listen carefully to hear this distinction. Meadowlarks, for example, all sing approximately the same song, but not precisely the same. Crows also have individuality in their calls.) Do some birds make a different sound than a song?

Possible Follow-up:

(1) Read poems: "Crows" by David McCord; and "The Blackbird" by Humbert Wolfe.

(2) Imitate any bird calls you can. Have the class imitate the crow.

(3) Read some poetry about birds perhaps not in local area: "The Woodpecker" by Elizabeth Madox Roberts; "The sea gull curves his wings" by Elizabeth Coatsworth. Discuss

the sounds made by these birds.

(4) Sing songs about birds in Kindergarten music book.

Insects and Worms

Note: These must be extemporaneous lessons, not a planned series, because they can only occur when the insect or worm is found or noticed.

1. Ladybug

Plan: Having found the insect, let it crawl on your hands while the discussion is going on. Afterward, let it fly away, or put it on a nearby bush. Explain that if all the class handled it, it would probably die.

Questions and Statements: Is this a good or bad (harmful) bug? How can you tell? Do any of you know why it is an especially good insect? They eat plant lice and scale insects. In the 1960's, the California fruit crops were almost destroyed by plant lice, and ladybugs were brought in to save the crops. Are all ladybugs the same color?

Possible Follow-up:

(1) Learn an old rhyme for fun.

Ladybug, ladybug
Fly away home!
Your house is on fire
And your children all burned,

All except little Ann,
And she crept under the frying pan.
----Old Rhyme

(2) Have the children compose a class experience story about "The Helpful Bug."

(3) Have class members count the ladybugs they see for one week, keeping a daily total, to find out whether there are many or few in the local area.

2. Earthworm

Plan: When earthworm castings are seen in the schoolyard, bring a shovel, and with the principal's permission, dig up a shovelful of dirt, perhaps finding earthworms. Another time for easy location of them is after it rains, when many come out of the ground to avoid drowning.

Questions and Statements: How does an earthworm move? (Lengthening its front part, then pulling up the hind part.) Can you see any eyes or ears or nose on it? (It is sensitive to heat, light, and touch, and breathes through its skin.) Does it have a mouth? What does it eat? (Dead plant material in soil.) Why is the earthworm considered a good worm? (It helps plants grow by breaking down humus in soil and letting air enter the soil through worm burrows; also good food for birds and fish.)

Possible Follow-up:

(1) Rhythmic movements by the class on the classroom floor like earthworms, to slow music.

(2) Art--cut and paste, using the following: 9"x12" blue background, 6"x9" light brown for ground, scraps of green cut into leaf-like weeds on top of ground, several medium-brown earthworms pasted on ground. (If roots have already been studied, some flesh-colored or yellow roots could be pasted on the ground paper, under the plant.)

(3) In a large jar, make a home for worms for a few days, using good moist soil, topped with grass or weeds, if possible. If the soil gets too dry and warm, the earthworms will die.

(4) Read the poem "A bird came down the walk" by Emily Dickinson.

3. Butterflies

Plan: Have class observe butterflies whenever they see them, and remember what they were doing, what they looked like, etc. Class might discuss their observations sitting under a tree on the lawn.

Questions: What does a butterfly look like?

Are all butterflies the same color? Butterflies were once what? What do you like best about butterflies?

Possible Follow-up:

(1) Read poems: "Fuzzy wuzzy, creepy crawly" by Lillian Schulz Vanada; "Butterfly" by Hilda Conkling; "Butterfly" by William Jay Smith.

(2) Rhythmic dance--to lively, light music, have class be butterflies and flowers, spreading their arms for wings, and pretending to get nectar from the flowers.

(3) Show World Book B butterfly plate pages to class to show different colorations.

(4) Art--using teacher-made pattern, copied and run off on a ditto, have the class outline areas on one wing with black crayon; fold it in half, and rub hard with side of pencil on the outside where there is no crayon. Hopefully, there will be enough marking to copy the black crayon marks. In small groups, have pupils color in areas with tempera paint; then fold again so that the colors will be a mirror image on the other wing. This is to emphasize the mirror-image idea.

4. Small bugs in grass

Plan: Have class lie down on schoolyard grass, and part the grass stems.

Questions and Statements: What insects or worms do you see? What are they doing? Are they large or small? Are they all insects and worms that are good for the grass? (Teacher may have to do some research if samples taken.) Did you know before that they were there? Think of the little lives going on beneath our feet, and we usually don't think about it or notice it.

Possible Follow-up:

(1) Read the poem "The House of the Mouse" by Lucy Sprague Mitchell, applying this home to those of the insects and worms seen.

(2) Write a class experience story about "Under Our Feet."

(3) Art--have class make a colored chalk, tempera, crayon, or cut-and-paste mural with grass and tiny bugs and worms shown.

The Sky

1. Shadows

Plan: Have class notice their shadows while going on walks, pretending to step on people's heads, noticing the length of them. Call

attention to shadows of trees, buildings, flagpole, etc. Come out early in the session one day and then late, noticing the difference in size.

Questions and Statements: What are shadows? Are there shadows on cloudy days? (May have to wait for a cloudy day to see.) Where is the light coming from to make the shadows? Can sunlight go through you, the building, the tree, the flagpole? Can a lamp make things have a shadow? Look tonight to see if it does.

Possible Follow-up:

(1) Read poems: "My Shadow" by Robert Louis Stevenson (ask reason for no shadow in last verse of poem--read again for class to listen for clue); "Shadow Dance" by Ivy O. Eastwick.

(2) Play a shadowing game--someone following right behind another and doing the same actions.

(3) Make shadow animals (duck, etc.) with hands in light from filmstrip machine with no film in it, the class imitating you.

(4) With parent help, make a shadow portrait of each child for a gift to give.

2. Cumulus clouds

Plan: Go out to an area of the schoolyard

where there is a clear view of the sky on a day when there are many cumulus clouds. Take a damp handkerchief with you, and spread it on the grass.

Questions and Statements: Look at the beautiful clouds! They're moving. What is pushing them? What are they made of? (May have to have some teacher input here.) Where did the water come from? Where is the water from this handkerchief going? When you run fast and get sweat on your forehead, where does it go, if you don't wipe it off? All kinds of water make up those beautiful clouds. Do the shapes of them look like something you know?

Possible Follow-up:

(1) Have class learn old poem "White sheep, white sheep" by unknown author.

(2) Read first verse of "Boats sail on the river" by Christina Rossetti.

(3) Art--blue 9"x12" construction paper sky with cotton balls glued on in cloud shapes.

(4) On other walks, call attention to different types of clouds.

3. Fog

Plan: Walk around the schoolyard in the fog. Notice the softened outlines of trees, buildings, etc. If fog has disappeared by classtime,

sit outdoors and have sharing about events that occurred in the fog, in their lives.

Questions and Statements: What is fog? What is it made of? What thing up in the sky is it like? Fog is like a cloud on the earth.

Possible Follow-up:

(1) Read poem "Fog" by Carl Sandberg.

(2) Have class color a picture, and then, with the flat side of the white crayon, color over it lightly to resemble fog.

(3) Have class members dictate individual stories about something they experienced in the fog (one or two sentences). They could illustrate it.

4. The color of the sky

Plan: During various walks, call attention to the color of the sky. On one day, discuss the differences seen.

Questions and Statements: Is the sky always blue? When is it the clearest blue? Why isn't the sky the same color all the time? Haze is like thin fog. Smog is haze or fog and smoke mixed together. From an airplane, it makes the air look brown. In the evening at sunset, the sky looks quite different. What do you think makes it look different then?

Possible Follow-up:

(1) Art--tempera paintings of a sunset sky.

(2) Ecology--have class cut out brightly-colored magazine pictures of outdoor scenes, and color over them with the flat side of brown crayons; then have them pasted on larger art papers, and if they are able, have class print "Smog is Bad."

(3) Listen to Ferde Grofe's "Sunset" portion of his "Grand Canyon Suite."

(4) Without saying its title, read the poem "Easter" by Joyce Kilmer.

Sounds

Identification of environmental sounds

Plan: Go out into a clear area of the schoolyard, and sit down. Being very quiet, identify the sounds that are heard, i.e., the tetherball rope hitting the metal pole, etc.

Questions and Statements: What do you hear? Find where the sound comes from.

Possible Follow-up:

(1) When a different sound from the usual sound is heard inside the classroom, have one child investigate while the others give their ideas about it.

(2) During free play time, suggest some use of

environmental sounds, i.e., cars.

(3) Urge children to stand in their kitchens at home with eyes shut, and try to think of the source of a sound.

(4) Ecology--discuss noise pollution and how to avoid unnecessary noise, i.e., not jumping on a metal drainage ditch cover over which the class walks.

CONCLUDING NOTES

A few additional facts about the preceding activities need to be clarified.

1. All poems, with the exception of the old ladybug rhyme and the author's poem, "The Sparrow," can be found in The Arbuthnot Anthology of Children's Literature (Arbuthnot 1961).

2. Almost all of these experiences could have class or individual language experience stories dictated about them, even if not given as a possible follow-up.

3. None of the possible follow-up has to be done. The principal value of these science experiences is to be found in the interaction between pupils and teacher.

Chapter 5

LIMITATIONS OF THE PROGRAM

The program presented in Chapter 4 is limited in this paper to being used with Kindergarten for science lessons in the springtime. It is able to be expanded into far greater use.

Other seasons of the year have not been covered, as well as many other studies that can be done in the springtime. All the seasons are rich with subjects to be discussed and learned about--seeds, bird migration, falling leaves, spiders, mud, the strength of fragile grass, etc.

Other elementary grades can profit greatly from including short outdoor experiences as part of their science lessons. Science dealing with the effects of the sun, with earth, water, etc., can certainly be more clearly understood and profitable for real learning if there are actual observations and experiences to back up words on a page. The act of discovery is regarded by educators as playing a vital role in learning.

Science is not the only subject that can profit from these short outdoor walks. The math concepts of form, for example, can be observed and discussed (What shape are the bricks....the parts of the sidewalk....the roof....the flagpole....the ball at the top of the flagpole, etc.?).

In higher math, there may be measuring, by trigonometric means, of buildings, etc., which must be done out-of-doors.

Ecology learning in any grade can be expedited by observation and activities outdoors.

Directionality in geography is learned far more easily with outdoor activities--at the teacher's direction, turning to north, south, east, west. Left and right orientation is helped in lower grades by interesting activities outdoors.

The basic principle in the expanding of the premise of this curriculum proposal to other grades, ages, and curricula is to open up the classroom walls to include the schoolyard as a very good source of learning materials and an excellent place in which to learn.

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